

# PATENT SPECIFICATION

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## PROVISIONAL SPECIFICATION

### Improvements relating to Fittings for Mixing Hot and Cold Water for Baths and the like

We, SAMUEL BOOTH & COMPANY LIMITED, of Cheapside Works, Cheapside, Birmingham, in the County of Warwick, a Company incorporated under the Laws of Great Britain, and HORATIO LEE, of the Company's address and a British Subject, do hereby declare the nature of this invention to be as follows:—

This invention has reference to improvements relating to fittings for mixing hot and cold water for baths and the like.

With fittings for mixing hot and cold water for baths of the kind heretofore in use the difficulty is experienced in practice that owing to the supply pressure of the hot water being considerably less than that of the supply pressure of the cold water there is a tendency for the cold water supply to create a pressure which is opposed to the hot water supply whereby a uniform and constant mixing does not obtain, the tendency being for the hot and cold water to be delivered in gushes with a preponderance of the cold water supply.

The present invention has for its primary object the provision of an improved fitting for mixing hot and cold water for the said purpose which is not subject to the disadvantage hereinbefore referred to, a further object of the invention being to provide an improved means for ensuring an even supply of cold water when the fitting is required to supply a spraying device.

The invention consists of an improved fitting for mixing hot and cold water for baths and the like which is characterised in that the hot and cold water are fed from their respective control cocks to a common outlet through separated passages one of which is disposed around the other whereby the greater pressure under which the cold water is supplied is caused to create a suction or "injector" effect which ensures a positive continuous flow of the hot water and thus secures a constant and uniform mixing.

The invention also consists in an improved fitting for mixing hot and cold water for baths which is provided with means for permitting the fitting to be

used with a spray device and which incorporates in the valve which determines whether the water shall be fed to the main outlet or to the spraying device a damping means for reducing the rate of flow of the cold water thereby ensuring that when the spraying device is in use and supplied with a mixture of hot and cold water the spray shall be maintained at a uniform temperature.

The invention also resides in the details of construction of the improved fitting for mixing hot and cold water to be described hereinafter.

In a convenient embodiment of the invention the improved fitting comprises a horizontally disposed length of pipe to the ends of which are secured hot and cold water cocks of known type said cocks controlling the usual hot and cold water supply. Adjacent to the centre of the said pipe the cold water is led through a curved elbow pipe which completely shuts off the cold water supply from the section of the pipe along which the hot water is led. Surrounding the outlet section of this elbow pipe, and located below the outlet rim thereof, is a segmental passage formed in a centrally disposed annular boss brazed to the central portion of the pipe said passage communicating with the section of the pipe along which the hot water supply is led. Fitted into the outlet end of the elbow pipe is an upstanding tube provided in the walls thereof with a plurality of oppositely disposed vertically arranged holes. This tube fits within a tubular sleeve the lower end whereof is carried by a spider which has a screw threaded engagement within the lower end of a plug valve. The sleeve is provided with a set of oppositely disposed holes which correspond in dimensions location and number to those in the upstanding tube, and one set of these holes registers with a port cut in the wall of the plug valve.

It will be appreciated of course that the spider serves to maintain the sleeve concentrically within the plug valve but with an annular space between the outer periphery of the said sleeve and the inner

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periphery of the plug valve.

The aforesaid sleeve is also provided in the wall thereof with a small hole which is in register with a further port cut in the wall of the plug valve.

The spider is provided with holes through which the hot water from the segmental passage can pass into the annular space in the plug valve.

The plug valve is located within a housing which is screwed on to the annular boss which is brazed to the central portion of the horizontal pipe said housing being provided with an outlet pipe and with a diametrically opposed screw threaded outlet pipe adapted for connection to a pipe leading to a spraying rose. The plug valve is provided with a squared extension which fits within a square hole formed in a washer provided with a knighting pin which engages within a segmental slot formed in the upper end of the housing. The square extension on the plug valve continues in a screw threaded cylindrical portion which co-operates with a nut said nut serving to fix on to the squared portion of the plug valve a handle section incorporating a cap having a depending flange which surrounds and envelops the upper end of the housing.

In use when it is desired that the water is to be filled into the bath the plug valve is turned by means of the handle so that the port in the plug valve which is in register with a set of holes in the sleeve is in register with the port in the wall of the plug valve housing which is in register with the main outlet. When this obtains the cold water flows along its section of the common pipe up through the upstanding tube and out through the holes in the walls thereof which are now in register with the corresponding holes in the sleeve and thence into the annular space in the plug valve. The hot water flows along its section of the common pipe up through the segmental passage into the annular space in the plug valve where it mixes with the cold water the mixture then flowing into

the bath through the common outlet.

It will be appreciated that as the hot water is fed into the interior of the plug valve through a passage which surrounds the cold water passage and the outlet wherefrom is disposed below the outlet for the cold water passage and that as the cold water is supplied at a greater velocity a suction or "injector" effect is produced which results in a positive feeding of the hot water which overcomes any tendency to the choking of the hot water supply which obtains with the fittings heretofore in use due to the hot water being supplied at a lower pressure than the cold water.

If it is desired to utilise the spraying rose the plug valve is turned by means of the handle until the port in the wall thereof which registers with the small hole in the sleeve is in register with the port in the housing which in turn registers with the outlet to the spray. In this position hot water can be supplied by way of the segmental passage to the annular space surrounding the sleeve while the cold water supply passes solely through the small hole in the wall of the sleeve. The damping of the flow of the cold water enables a uniform temperature of the spray to be obtained since after the initial setting of the taps to obtain the required temperature any possibility of a rapid change in temperature which could result in scalding due to failure of the cold water supply or to inadequate mixing is obviated.

Although the invention has been described in its application to a hot and cold water mixing fitting for baths it will be appreciated that it is equally applicable to lavatory basins or other similar appliances where supplies of mixed hot and cold water are required.

Dated this 13th day of July, 1937.

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#### COMPLETE SPECIFICATION

#### Improvements relating to Fittings for Mixing Hot and Cold Water for Baths and the like

We, SAMUEL BOOTH & COMPANY LIMITED, of Cheapside Works, Cheapside, Birmingham, in the County of Warwick, a Company incorporated under the Laws of Great Britain, and HORATIO LEE, of the Company's address and a British Subject, do hereby declare the nature of this invention, and in what manner the same

is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention has reference to improvements relating to fittings for mixing hot and cold water for baths and the like.

With fittings for mixing hot and cold water for baths of the kind heretofore in

use the difficulty is experienced in practice that owing to the supply pressure of the hot water being considerably less than that of the supply pressure of the cold water there is a tendency for the cold water supply to create a pressure which is opposed to the hot water supply whereby a uniform and constant mixing does not obtain, the tendency being for the hot and cold water to be delivered in gushes with a preponderance of the cold water supply.

The present invention has for its primary object the provision of an improved fitting for mixing hot and cold water for the said purpose which is not subject to the disadvantage hereinbefore referred to, a further object of the invention being to provide an improved means for ensuring an even supply of water at a uniform temperature when the fitting is required to supply a spraying device.

The invention consists of an improved fitting for mixing hot and cold water for baths and the like which is characterised in that the hot and cold water are fed from their respective control cocks to a common outlet through separated passages one of which is disposed around or partially around the other whereby due to the greater pressure under which the cold water is supplied the flow of cold water is caused to create a suction effect on the flow of the hot water which ensures a positive continuous flow of the hot water and thus secures a constant and uniform mixing.

The invention also consists in an improved fitting for mixing hot and cold water for baths according to the preceding paragraph which is provided with means for permitting the fitting to be used with a spray device and which incorporates in the valve which determines whether the water shall be fed to the main outlet or to the spraying device a means for restricting the rate of flow of the cold water thereby ensuring that when the spraying device is in use and supplied with a mixture of hot and cold water adjusted to the required temperature, the said temperature shall be maintained uniform by reason of the restriction of the cold water supply preventing the superior pressure at which the cold water is supplied upsetting the balance of temperature of the mixture.

The invention also resides in the details of construction of the improved fitting for mixing hot and cold water to be described hereinafter.

The invention will now be described with particular reference to the accompanying drawings wherein:—

Figure 1 is a perspective view of a bath fitting constructed in accordance with the

invention.

Figure 2 is a perspective view on a larger scale and partly broken away, of the material portion of the fitting illustrating in Figure 1.

Figure 3 is a longitudinal vertical section of a part of the portion of the fitting illustrated in Figure 2.

Figure 4 is a cross sectional view taken on the plane indicated by the line 4—4 Figure 3 looking in the direction of the arrows to said line.

Figure 5 is a perspective view of a domestic sink fitting constructed in accordance with the invention, and

Figure 6 is a sectional view of the material part of the fitting illustrated in Figure 5.

In the drawings like references indicate similar parts in the several views.

In the embodiment of the invention illustrated in Figures 1—4 the improved fitting comprises a T-shaped pipe 7 to the ends of the arms 7<sup>a</sup> and 7<sup>b</sup> of which are secured hot and cold water cocks A and B of known type said cocks A and B controlling the usual hot and cold water supply. Adjacent to the centre of the said pipe the cold water is led from the arm 7<sup>b</sup> along which the cold water is supplied through an internal curved passage 7<sup>d</sup> which completely shuts off the cold water supply from the arm 7<sup>a</sup> of the pipe along which the hot water is led. Partially surrounding the outlet section of the said internal passage 7<sup>d</sup> is a segmental passage 7<sup>e</sup> said segmental passage 7<sup>e</sup> communicating with the arm 7<sup>a</sup> of the pipe 7 along which the hot water supply is led. Fitted into the outlet end of the internal passage 7<sup>d</sup> is the open end of a tube 8 the outer end of which is closed, said tube 8 being provided in the walls thereof with a pair of oppositely disposed elongated slots 8<sup>a</sup>. This tube 8 fits within a tubular sleeve 9 the inner end whereof is provided with ear pieces 9<sup>a</sup> having herein holes through which are passed screws which are engaged with tapped holes formed in complementary ear pieces 10<sup>a</sup> made integral with a hollow plug valve 10. The sleeve 9 is provided with a pair of oppositely disposed elongated slots 9<sup>b</sup> which correspond in dimensions and location to the elongated slot 8<sup>a</sup> in the outstanding tube 8, and one of these slots 9<sup>b</sup> registers with a slot 10<sup>b</sup> cut in the wall of the hollow plug valve 10.

It will be appreciated that the method of securing the sleeve 9 within the plug valve 10 maintains the sleeve 9 concentrically within the said plug valve 10 but with an annular space between the outer periphery of the sleeve 9 and the inner peri-

phery of the plug valve 10.

The aforesaid sleeve 9 is also provided in the wall thereof with a small hole 9<sup>c</sup> which is in register with a further port 5 10<sup>c</sup> cut in the wall of the plug valve 10.

It will also be appreciated that the hot water from the segmental passage 7<sup>c</sup> can pass into the annular space enclosed by the plug valve 10.

10 The plug valve 10 is located within a housing 12 which is screwed on to the stem of the pipe 7 said housing 12 being provided with an outlet pipe 12<sup>a</sup> and with a diametrically opposed screw threaded outlet pipe 12<sup>b</sup> adapted for connection to a pipe 13<sup>a</sup> leading to a spraying rose 13. The plug valve 10 is provided with a squared extension 10<sup>d</sup> which fits within a square hole formed in a washer 14 provided with a knighting pin 14<sup>a</sup> which engages within a segmental slot formed in the outer end of the housing 12. The square extension 10<sup>d</sup> continues in a screw threaded cylindrical portion which co- 25 operates with a nut 16 said nut 16 serving to fix on to the squared portion 10<sup>d</sup> a handle 17 incorporating a cap 17<sup>a</sup> which surrounds and envelops the outer end of the housing 12.

30 In use when it is desired that the water is to be filled into the bath the plug valve 10 is turned by means of the handle 17 so that the slot 10<sup>b</sup> in the plug valve 10 which is in register with one of the slots 35 9<sup>b</sup> in the sleeve 9 is in register with the passage in the housing 12 which leads to the main outlet 12<sup>a</sup>. When this obtains the cold water flows along the arm 7<sup>b</sup> of the common pipe 7 through the internal 40 passage 7<sup>d</sup> into the interior of the out-standing tube 8 and thence through the slots 8<sup>a</sup> in the walls thereof which are now in register with the corresponding slots 9<sup>b</sup> in the sleeve 9 and thence into the annular space in the plug valve 10. The hot water 45 flows along its arm 7<sup>a</sup> of the common pipe 7 through the segmental passage 7<sup>e</sup> into the annular space in the plug valve 10 where it mixes with the cold water the mixture then flowing into the bath 50 through the slot 10<sup>b</sup> in the plug valve 10 into the common outlet 12<sup>a</sup>.

It will be appreciated that as the cold water passage 7<sup>d</sup> projects beyond the out- 55 let from the segmental hot water passage 7<sup>e</sup> and that as the cold water is supplied at a greater velocity the flow of the cold water exerts a suction effect on the flow of the hot water which results in a posi- 60 tive feeding of the hot water which overcomes any tendency to the choking of the hot water supply which obtains with the fittings heretofore in use due to the hot water being supplied at a lower pressure 65 than the cold water.

If it is desired to utilise the spraying rose 13 the plug valve 10 is turned by means of the handle 17 until the port 10<sup>c</sup> in the wall thereof which registers with the small hole 9<sup>c</sup> in the sleeve is in register with the outlet 12<sup>b</sup> from the hous- 70 ing 12 which connects with the pipe 13<sup>a</sup> leading to the spraying rose 13. In this position hot water can be supplied by way of the segmental passage 7<sup>c</sup> to the annular space surrounding the sleeve 9 while the cold water supply passes by way of a slot 8<sup>a</sup> and the small hole 9<sup>c</sup> in the wall of the sleeve 9 into the aforesaid annular space. The restriction of the flow of the cold water due to the necessity of its passage through the small hole 9<sup>c</sup> enables a uniform tem- 75 perature of the spray to be obtained since after the initial setting of the taps to obtain the required temperature any possibility of the upsetting of the balance of temperature of the mixture by the cold water due to the superior pressure at which the cold water is supplied, is obviated.

Figures 5 and 6 illustrate the invention as applied to a domestic sink fitting and according to this application of the inven- 90 tion the common pipe 7 is provided with an internal partition 7<sup>f</sup> which completely shuts off the bore of the arm 7<sup>a</sup> of the said pipe from the bore 7<sup>b</sup> of the pipe 7. The partition 7<sup>f</sup> is provided with a hole in which is secured the upper end of a 95 length of tube 18 the lower end of which depends into the common outlet 12<sup>a</sup>. This outlet 12<sup>a</sup> is secured to the stem of the pipe 7 so as to be capable of a swivelling movement. In this modification the passage 7<sup>e</sup> for the hot water completely 100 surrounds the passage 7<sup>d</sup> for the cold water.

Although the invention has been described and illustrated in its applica- 105 tion to hot and cold water mixing fittings for baths and domestic sinks it will be appreciated that it is equally applicable to lavatory basins or other similar appliances where supplies of mixed hot and cold water are required.

It may be remarked here that it has 115 been proposed heretofore in taps or cocks of the type often employed on wash-basins to lead hot and cold water separately through concentric passages closed by a single valve which regulates the distribu- 120 tion of cold or hot water or a mixture of them at any determined temperature and that it has also been proposed heretofore to utilise in a water or other liquid heater a mixing valve in which the cold 125 water is led into a conduit of an under-casting and in which warm water is led into a conduit of the same casting and in which the spaces into which the cold and hot water are led and opened partly by a 130

ring shaped cylinder provided with holes and partly by a valve so that a moderate stroke of this cylinder and this valve allows cold water to enter the space of the casting, whilst a stroke corresponding to the height of the valve allows the warm water to enter, whilst the under ring shaped part of the cylinder already begins to regulate the entrance of the cold water whereby in consequence of the parallel direction of the cold and warm water currents these do not retard one another but they are completely mixed for they are obliged to flow back in a conduit which changes their direction to the contrary direction in order that they may flow out thoroughly mixed.

The present invention is differentiated from the foregoing prior construction in that the hot and cold water flow to a common outlet along separated passages after the degree of flow of each has been determined by its respective control cock, and in that one of the said separated passages is disposed around or partially around the other whereby due to the greater pressure under which the cold water is supplied the flow of cold water is caused to create a suction effect on the flow of the hot water which ensures a positive continuous flow of the hot water and thus secures a constant and uniform mixing.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A fitting for mixing hot and cold water for baths and the like which is characterised in that the hot and cold water are fed from their respective control cocks to a common outlet through separated passages one of which is disposed around or partially around the other whereby due to the greater pressure under which the cold water is supplied the flow of the cold water is caused to create a suction effect on the flow of the hot water which ensures a positive continuous flow of the hot water and thus secures a constant and uniform mixing.

2. A fitting for mixing hot and cold water for baths and the like comprising a pipe in communication at one end with a control means for the hot water supply and at the other end with a control means for the cold water supply, means disposed within said pipe for separating the cold water from the hot water supply, after their passage from the respective control means, means in association with the said separating means for causing the water from one supply source to flow around or partially around the water from the other supply source, a common chamber into

which the two supplies are directed for mixing and a common outlet from said mixing chamber, the separation of the two supplies after their passage from their respective control means and the causing of the one supply to flow around the other supply enabling the flow of the cold water due to the greater pressure under which the cold water is supplied to create a suction effect on the flow of the hot water which ensures a positive continuous flow of the hot water and thus secures a constant and uniform mixing.

3. A fitting for mixing hot water and cold water for baths and the like comprising a pipe in the form of a T-piece the end of one arm whereof is in communication with a control means for the hot water supply and the end of the other arm whereof is in communication with a control means for the cold water supply, a housing secured to the intermediate portion of the pipe and incorporating a fixed outlet means, a hollow plug valve turnably mounted within the said housing and having therein a ported means adapted to be caused to be moved into and out of register with the fixed outlet means from the housing, a sleeve located within the hollow plug valve and movable therewith but spaced therefrom so that an annular space which constitutes a mixing chamber obtains between the sleeve and the plug valve, ports formed in the walls of said sleeve, a tube adapted to fit within the sleeve one end of the said tube being closed whereas the other end of the tube has communication with one only of the sources of water supply and means incorporated in the pipe which divides the hot water supply from the cold water supply and which causes the supply which is not conveyed into the aforesaid tube to flow around the said tube into the aforesaid annular space, the separation of the two supplies and the causing of the one supply to flow around the other supply enabling flow of the cold water due to the greater pressure under which the cold water is supplied to create a suction effect on the flow of the hot water which ensures a positive continuous flow of the hot water and thus secures a constant and uniform mixing.

4. A fitting for mixing hot and cold water for baths according to Claim 1, which is provided with and which incorporates means for permitting the fitting to be used with a spray device and which incorporates in the valve which determines whether the water shall be fed to the main outlet or to the spraying device a damping means for restricting the rate of flow of the cold water thereby ensuring that when the spraying device is in use and

supplied with a mixture of hot and cold water the spray shall be maintained at a uniform temperature for the reasons hereinbefore specified.

- 5 5. A fitting for mixing hot and cold water for baths according to Claim 3 wherein the sleeve is provided with a small apertured means which can be brought into register with the interior of the tube  
10 so as to place the interior of the tube in communication with the annular space and wherein the said apertured means is complementary to openings in the plug valve and the housing and wherein the  
15 plug valve can be turned so as to bring the said small apertured means and the afore-said openings into register for conducting the mixed water to a spraying device, the  
20 damping device for restricting the rate of

flow of cold water when fed into the tube for the purpose specified.

6. A fitting for mixing hot and cold water for baths constructed, arranged and adapted for use substantially as herein described with particular reference to Figures 1 to 4 of the accompanying sheet of drawings. 25

7. A fitting for mixing hot and cold water constructed, arranged and adapted for use substantially as herein described with particular reference to Figures 5 and 6 of the accompanying sheet of drawings. 30

Dated this 1st day of July, 1938.

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